editions and recensions. See *Oddities* I:13, II:9, *Marvels:*1, *Stargazer:*14.

5 'Merely corroborative detail, intended to give artistic verisimilitude to an otherwise bald and unconvincing narrative' – W.S. Gilbert, *The Mikado* (1885).

6 He did not mention my name, but I no longer care …

7 From which we are just emerging. Our present perception of global warming may be in reality no more than this.

THE DANGERS OF OVER-RATIONALISATION, OR GIANT SQUIDS ARE RED HERRINGS

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Introduction

Both cryptozoologists and skeptics alike search for naturalistic explanations of historical accounts of fantastic animals. But such an approach has dangers. Accounts of animals in old texts may have more cultural origins than zoological ones (e.g. Meurger, 1988, 1999; Baxter, 1998) and there may be a danger of oversimplifying a complex phenomenon. A convenient explanation is found, the mystery is solved and the world moves on. But the given explanation may not actually adequately explain the phenomena under study. Giant squid (*Architeuthis* sp.) have been used as just such a convenient rationalisation for accounts of sea monsters. The giant squid has been used to explain away the kraken (which 'everyone' knows was a giant squid); a strange 'sea monk' reported in the Renaissance natural histories (which the describer of the giant squid thought was a giant squid); and the great sea serpent (which are giant squids cruising the world's seas with their tentacles sticking out of the water). All of these propositions can be shown to be unlikely (albeit not impossible) given the wider historical context of the accounts under consideration and the little that is known of the biology of the giant squid.

What do we Know about Giant Squid?

Architeuthis sp. are thought to be midwater predators upon smaller squid, fish and other animals (reviewed by Ellis, 1998; Roper & Boss, 1982). They occur worldwide up to quite high latitudes (Ellis, 1998, Table p. 257). Giant squid are also themselves prey. Juvenile giant squid are taken on by such fishes as the large midwater predator *Alepisaurus* and a variety of other animals (Ellis 1998; in addition, elephant seals - *Mirounga* sp. - Antonelis *et al.,* 1994). As adults they are only known to be consumed by the sperm whale (*Physeter catodon*) (e.g. Clarke, 1980). Presumably sperm whales cannot eat the very largest squid as the whales generally swallow their food whole and it is

difficult to imagine even the biggest bull sperm whales taking a 55ft long *Architeuthis*. Strangely, as far as I am aware, no one has addressed the interesting question of exactly how large a squid a sperm whale could swallow.

As *Architeuthis* has rarely (if at all) been authentically seen in healthy condition at sea, science knows almost nothing of its behaviour in the wild. Conclusions can only be inferred from what is known of its physiology and morphology. Opinion differs as to its lifestyle. Whilst some marine biologists suggest it is a strong active hunting predator, others think it is a passively drifting predator with weak musculature, without the nervous wherewithal to actively hunt (Ellis, 1998). It has the largest eyes of any animal (Anon, 1998), which seems incompatible with the idea of its being a passive predator. The longest authenticated specimen measured 57ft (Ellis, 1998). Most accounts of *Architeuthis* imply that they are solitary although there have been purported sightings of a large school of giant squid (Ellis, 1998, pp. 240 & 248).

We can also, on less sturdy grounds, make hypotheses about its behaviour and physiology based on what we know of other squid species. It almost certainly cannot tolerate low salinities; almost all known squids cannot regulate their own bodies' salinity and therefore have a narrow toleration of salinity fluctuations (Withers, 1992; Boyle, 1991). It also means that in common with *almost* all other ten-armed cephalopods (the family of octopuses, squids and nautiluses) it carries its tentacles (the two longer arms) within the rest of its arms (Woods, personal communication, 2003). They do not protrude, except while grabbing prey.

Architeuthis as a Sea Serpent

The latter two conclusions (if they are correct) immediately undermine two hypotheses concerning the possibility of giant squid being mistaken for other animal forms. Firstly, giant squid cannot exist in freshwaters as was proposed for Loch Ness by Shiels (1984) or, for example, in the Baltic where there is reduced salinity. Therefore they are unlikely to be a source of freshwater monster accounts. Secondly, they are unlikely to cruise the world's oceans with their tentacles sticking out of the water, looking in profile like the archetypical sea serpent. Even if they do stick their tentacles beyond the other eight arms (some deep water squids do this, so it is not wholly improbable) they might, if the weak *Architeuthis* lobby is correct, lack the musculature to carry their arms for any length of time into the air (although I have come across no references that specifically address the question of the strength and stamina found in the arms and tentacles of *Architeuthis*). Further, I know of no accounts of smaller squid placing both their tentacles out of their water unsupported for any length of time (one tentacle by itself is obviously useless for grabbing prey). Nor are there any accounts of squid grabbing airborne prey.

Incidentally, at this point it is as well to question the belief that squids attack ships because they think it is their enemy, the sperm whale. No animal will actively hunt down and attack its predators. This is a sure way to extinction. There is no more reason to expect squid to attack sperm whales than gazelles to hunt down and attack lions.

Although the 'giant squid tentacle as sea serpent neck' theory is often mentioned in popular books (e.g. Miller et al., 1977), most interpretations of giant squids as sea serpents have not in fact used this posture at all. The

earliest use of the giant squid to explain the sea serpent that I can find comes from 1883 by Henry Lee in his booklet *Sea Monsters Unmasked*. Lee explicitly mentioned the characteristics of a giant squid that could give rise to a sea serpent interpretation by a reference to an actual sighting of a sea serpent in 1845 reported to the Archdeacon of Molde! The giant squid is 'a long marine animal', with 'two fins near the forefront of the body' which moves in apparent undulations(?), it 'boils the water', the body is 'round and of a dark colour' and it disturbs the water behind it (i.e. behind its direction of movement). Of course the giant squid does have these characteristics but then so do just about all other large marine animals.

Lee interpreted a number of famous sea serpent cases as giant squids including the most famous sea serpent of all, the creature seen by the crew of H.M.S. *Daedalus* in the South Atlantic in 1848. The *Daedalus* was *en route* to St. Helena at 5 o'clock in the afternoon on the 6th August 1848 when at lat. 24°44'S, long. 9°22'E she encountered a sea serpent:

On our intention being called to the object it was discovered to be an enormous serpent, with head and shoulders kept about four feet constantly above the surface of the sea, and as nearly as we could approximate by comparing it with the length of what our main-topsail yard would show in the water, there was at very least 60 feet of the animal <u>à fleur d'eau</u>, no portion of which was, to our perception, used in propelling it through the water, either by vertical or horizontal undulation. It passed rapidly, but so close under our lee quarter, that had it been a man of my acquaintance, I should have easily recognised his features with the naked eye; and it did not, either in approaching the ship or after it had passed our wake, deviate in the slightest degree from its course to the S.W., which it held on at the pace of from 12 to 15 miles per hour. Apparently on some determined purpose.

The diameter of the sea serpent was about 15 or 16 inches behind the head, which was, without any doubt, that of a snake, and it was never, during the 20 minutes that it continued in the sight of a our glasses, once below the surface of the water; its colour was a dark brown, with yellowish white about the throat. It had no fins, but something like a mane of horse, or rather a bunch of seaweed, washed about its back. It was seen by the quartermaster, the boatswain's mate and the man at the wheel, in addition to myself and officers above mentioned.

I am having a drawing of the serpent made from a sketch taken immediately after it was seen, which I hope to have ready for transmission to my Lords Commissioners of the Admiralty by to-morrow's post.

I have, &c.

Peter M'Quhae, Captain. (Letter to the Admiralty reprinted in the *Times* 14.10.1848)

Lee's explanation of this serpent is unconvincing (as he partially conceded) because the crew got so close as to see the head in some detail and presumably they would have seen the distinct tentacles and eye of a squid. The *Daedalus* serpent was countershaded (darker on top, fading below) however, which is compatible with a slightly lightening of the colour known to occur on the ventral surface of *Architeuthis*. There is only one feature that is shared by the *Daedalus* serpent and a squid, the presence of a fin. But even this feature on the dorsal surface of the seen animal, is irreconcilable with the terminal mantle fin of a squid. Arguments that invoke

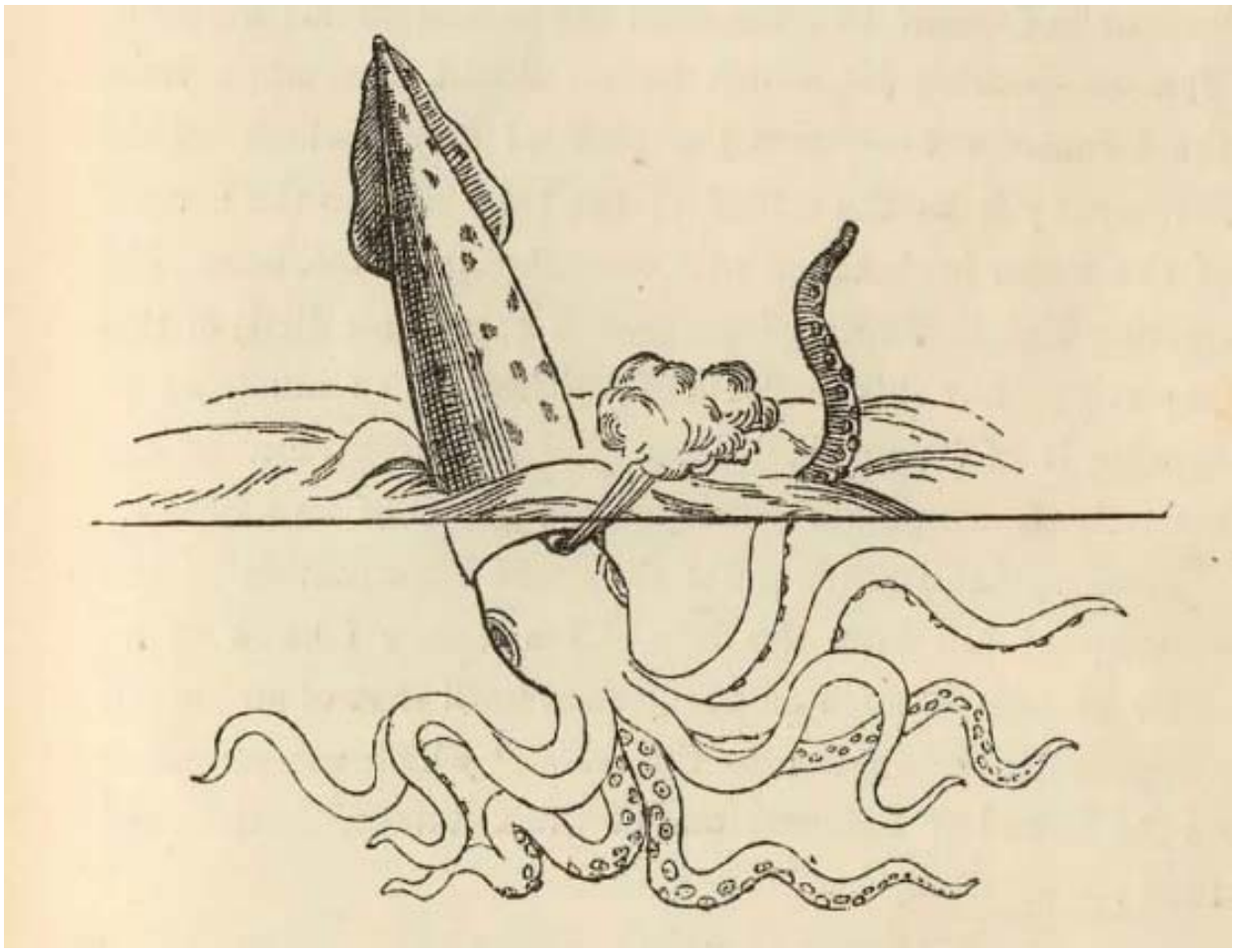

Figure 1
Lee's (1883) reconstruction of the Egede animal as a giant squid.
In fact *Architeuthis* has semicircular fins.

the fact that the *Daedalus* animal was long and thin and hence(?) squid-like once more have to preclude a number of other long and thin animals that would, if anything, be even more likely to appear serpentine on the surface (e.g. cetaceans, sharks or oarfishes, a genus of strange serpent like bony fishes). Exactly the same argument can be advanced for squid explanations (proposed by Ellis, 1998) for a sea serpent seen from H.M.S. *Plumper* in December 1848 (see also Heuvelmans, 1968) and a sea serpent seen by a Mr. Von Ferry reported by Pontoppidan (1752-1753, 1755).

The next sea serpent sighting invoked as a giant squid sighting is perhaps the most convincing of all. The captain of the barque *Pauline* saw a white sea serpent wrapped around a sperm whale struggling at the surface. It seems quite plausible that in fact the captain saw a sight almost as rare as a sea serpent: a sperm whale feeding on its favourite food – large, if not giant, squid, with the latter's arms or tentacles wrapped around the former.

Another famous account of a sea serpent that Lee suggested was in fact a giant squid was the account of Egede (P. Egede, 1741; H. Egede, 1741, 1745) of an animal seen off the coast of Greenland in 1734:

But none of them have been seen by us, or any of our Time, that I could hear, save for that most dreadful Monster, that shewed itself upon the Surface of the Water in the Year 1734, off our New Colony in 64 Degrees. This Monster was of so huge a Size, that coming out of the Water, its Head reached as high as the Mast-Head; its Body was as bulky as the Ship, and three or four times as long. It had a long pointed Snout, and spouted like a Whale-fish; great broad Paws, and the body seem covered in Shell-Work, its Skin was very rugged and uneven. The under Part of its Body was shaped like an enormous huge Serpent, and when it dived again under Water, it plunged backwards into the Sea, and so raised its Tail aloft, which seemed a whole Ship's Length distant from the from the bulkiest part of the Body. (Egede, 1741)

These accounts have recently been reviewed by Paxton *et al.* (in press) and Thomas (1996). Thomas (1996) suggested the Egede serpent was a zeuglodont whale (an extinct primitive form of whale) whereas Paxton *et al.* (in press) suggest it was a right, humpback or grey whale.

Lee (1883) suggested that the Egede serpent was a squid (Figure 1) in some distress upon the surface of the water, a thesis that has received recent support from Ellis (1998). Despite the occurrence of *Architeuthis* sp. at high northern latitudes (Ellis, 1998), again neither multiple appendages (apart from the two flippers) nor the prominent eyes nor the burgundy/maroon/crimson of a giant squid are recorded. One account does say the eyes glowed like red fire, but *Architeuthis* is not known to have glowing red eyes, although interestingly a possible early description of a giant squid (a 'prickly fish' mentioned in Magnus, 1555) does also have this characteristic. One primary account refers to the animal as 'blowing like a whale' and Lee suggested that the whale-like blow could be water coming out of the siphon. But why not assume parsimoniously that the Egede animal is indeed a whale rather than invoking a mode of behaviour that has not been seen in *Architeuthis*? Nor have living (albeit moribund) *Architeuthis* been seen rearing out of the water. Further, the supposed posture (Figure 1) suggested by Lee needed for the squid to appear as the Egede animal would seem incompatible with a giant squid whose centre of gravity would presumably be somewhere in the mantle cavity. If the mantle was full of air then the posture could occur but then the animal would not have been able to submerge. The Egede animal was observed to submerge several times (P. Egede 1741).

The final sighting that is mentioned as a possible squid sighting is that seen from the Earl of Crawford's yacht *Valhalla* in 1905**.** Here we have several accounts of an encounter with a serpent by two naturalists, E.G.B. Meade-Waldo and M.J. Nichol (Nichol, 1909):

At 10.15a.m. on Thursday, December 7, 1905 when in lat. 7°14'S., long. 34°25'W., in a depth of from 322 to 1340 fathoms, Meade-Waldo and I saw a most extraordinary creature about 100 yards from the ship and moving in the same direction, but very much slower then we were going. At first, all that we could see was a dorsal fin about four feet long sticking up about two feet from the water; this fin was of a brownish-black colour and much resembled a gigantic piece of ribbon seaweed. Below the water we could indistinctly see a very large brownish-black patch but we could not make out the shape of the creature. Every now and then the fin

entirely disappeared below the water. Suddenly an eel-like neck about six-feet long and of the thickness of a man's thigh, having the head shaped like that of a turtle, appeared in front of the fin. This head and neck, which were of the same colour above as the fin, but of a silvery white below, lashed up the water with a curious wriggling movement. After this it was so far astern of us that we could make out nothing else.

Again the description is not obviously reconcilable with a squid (apart from being long and thin) which has to be placed sideways (with the mantle fin uppermost) in the water to match the description. Again it seems doubtful that a squid would not have been recognised especially by two zoologists even though they were at a distance (see below).

At the *considerable* risk of presenting a circular argument, there is not one first-hand account of an initially unidentified sea monster which mentions any of the distinctive diagnostic characteristics of a large cephalopod - i.e. multiple appendages and prominent eyes. Admittedly from a distance a squid at the surface may not look like a squid (there are no data on this) but in the cases given above the animal was seen in reasonably close proximity (*Daedalus*) or reared out of the water (the Egede sighting). Even in the *Pauline* case, whilst the animal could be a giant squid (but see Paxton *et al.* (in press) for an alternative explanation), no diagnostic characteristics are given. Only the *Valhalla* sighting was seen at a distance (Meade-Waldo had to use binoculars). Further if the natural colour of *Architeuthis* is maroon then this distinctive colour has not been reported either. It is not that some of these sightings could *not* be giant squid but that any general features that could be ascribed to a giant squid could equally, if not better, apply to other animals.

Architeuthis as Kraken prior to the 19th Century

It is now popularly assumed that the giant squid was the basis of the Scandinavian sea monster, the kraken. Indeed the two terms are now used almost synonymously. This theory really developed from Pontoppidan's (1752-1753, 1755) descriptions in his *Natural History of Norway* by way of Pierre Denys de Monfort's *Histoire Naturelle de Mollusques*. Pontoppidan himself thought his kraken was 'of the Polype, or of the Starfish kind'. Pontoppidan further describes an account of a young kraken as an animal with 'extended long arms and antennae'. However Pontoppidan was by no means wholly convinced by his favoured explanation of a 'polype' and pointed out that some people thought that the young of the kraken was the Medusa's Head, *Gorgonocephalus,* a brittle star (a type of starfish)!

The squid explanation was given its most modern form in English by Heuvelmans (1968) in his book '*In the Wake of the Sea Serpents*'. Heuvelmans arguably created a slightly distorted historiography of the kraken, blurring distinct accounts of sea monsters into a single history. It also should be mentioned that there are *no* first hand accounts of an encounter with a sea creature explicitly described by the witnesses as a 'kraken' known to me.

The cephalopodan explanation for the kraken was attacked by Meurger (1999) who pointed out that an Italian traveller to the north, Francesco Negri (1623-1698) had described an animal called the *sciu-crac* 'which is a fish of enormous size…Its shape is round and flat, fitted with numerous horns or arms…some say

the sciu-crac may grow to a whale's size.' Meurger argued that this was almost identical to Pontoppidan's description and pointed out that one of the words that Pontoppidan said was used for this creature was *krabben*, the crab (see etymological note below), so the animal is being portrayed is an enormous crab not a squid (although presumably this explanation must also have occurred to Pontoppidan). Further he found that Franz Paullinus (1643-1711) in two works of 1706 (*Observationes Medico-physicae*) and 1709 (*Philosophische Lust-Stunden)* also described northern Scandinavian reports of a giant crab-like monster which ascends to the surface and attacks boats with its claws. Meurger (1999) speculated that there was a connection between the crab-like kraken and the ubiquitous island monster of the Greek *Physiologus* and the European Latin and vernacular bestiaries. This animal, in so far as it can be said to have a zoological basis, was a turtle or a whale (Paxton, in preparation). Hence there are no morphological or historical grounds to link the pre-Pontoppidan kraken with a cephalopod.

In fact we can firmly link the kraken to the medieval island monster. Hans Egede (1741, 1745) of sea-serpent fame says that the word *kracken* was used by Norwegian fisherman for exactly the same monster described by Icelanders as the *hafgufa*. Egede, incidentally, thought the kraken fabulous. The name *hafgufa* can itself be followed back to the 14th century Scandinavian wonderbook the *Speculum Regale* ('The Royal Looking Glass') arguably one of the finest non-fictional works of the Middle Ages. Here an island-like monster is given the name *hafgufa*. This animal in turn is an almost identical description of the island monster of the bestiaries, the *Aspidochelone*, an animal which can possibly be traced back to the Babylonian Talmud (Coulter, 1926, Cook, 1919) and in a separate(?) fictional lineage turns up in the tales of St. Brendan and of Sinbad in the *1001 Nights* (Paxton, in preparation).

Thus the history of the kraken is considerably more complicated than that of a blurred account of a giant squid or octopus. More research needs to be undertaken in this area.

The Giant Squid as a 'Sea Monk'

Another sea monster that has been interpreted as a giant squid has been the 'sea monk' washed up on the coast of Denmark in 1546 (Paxton & Holland, in press). It was described and illustrated in a number of mid-16th century natural histories. The giant squid attribution was made by Johannes Japetus Steenstrup (the 19th century describer of *Architeuthis*). Steenstrup (1980) compared the illustrations of the sea monk to an *Architeuthis*, shaped not as in life but in morphology like the far smaller squid genus *Loligo*, presumably because Steenstrup had no whole body material by which to make a comparison. However Steenstrup's identification forced him to ignore the fact that all the detailed commentaries referred to the animal as scaled, a feature irreconcilable with a squid, giant or otherwise. A good case on morphological, etymological and historical grounds can be made that the sea monk was in fact an angelshark *Squatina squatina* (Paxton & Holland, in press).

Discussion

Given the lack of specific characteristics to diagnose the above monster accounts as giant squid, why have giant squids been so readily taken as the source of sea monster tales and sightings? No quantitative evidence is

available to answer this question, so it is necessary to rely on anecdote and speculation.

A re-occurrent characteristic of cryptozoological interpretations of early natural historical texts has been a failure to consider sources both fully and in their wider context. The author himself is guilty of this in that I have been unable to systematically consider one important potential source for this article, Denys de Monfort's (1802) *Histoire Naturelle de Mollusques* which is almost certainly an important text in understanding the transition of jellyfish-like kraken to squid-like kraken. Further, I have not yet looked at the works of Negri, Paullinus and a number of other early relevant texts.

Similarly Egede's (1741, 1745) comment on the kraken has been overlooked by scholars who have tended to consider excerpts from the poor 1745 English translation of Egede rather than that book in its entirety, despite its importance to the history of sea monsters. We can infer, for example, exactly which species of whale the Egedes were familiar with and *those that they were not* and this has very important implications for interpretations of the Egede accounts of the sea monster seen in 1734 (Paxton et al. in press).

Giant squid are comparatively new. They were only formerly described by science in the 1850s. This does not mean, as perhaps suggested by Heuvelmans (1968), they were not accepted by science. No less a person than Joseph Banks, the personification of the scientific establishment in early 19th century England found (and ate!) giant cephalopod material (not in fact *Architeuthis*) whilst on Captain Cook's 1768-1771 voyage around the world. Belief in the existence of giant cephalopods did not place a natural philosopher beyond the scientific pale prior to 1860 but just on the ultimately winning side of a very low-key scientific debate. Again, the history of the recognition of giant squids by science is a field that requires more research.

Nonetheless, their large size, rarity and comparative morphological difference from the average backboned giant animals made *Architeuthis* an ideal choice as an unusual suspect for sightings of unknown animals. Further, the lack of knowledge concerning their biology meant that such speculation was safe and convincing.

Perhaps the other reason why people may have so readily accepted the giant squid explanation is that investigators' ease with a solid prosaic explanation blinded them to its weaknesses. For nearly 150 years Steenstrup's *Loligo* representation of a giant squid went unchallenged in the scientific literature. The danger to those, the present author included, who have a tendency to explain away strange sightings is readily apparent. The devil really is in the detail. We must pay attention to the detailed, diagnostic features of sightings, be it of monster, ghost or UFO, and compare them to all possible animals or phenomena that may occur in the environment under consideration. This means we must devote as much, if not more, time to considering known explanations as to considering unknown ones and think about all of our explanations equally critically whether monster, giant squid or whale or alien spacecraft, secret military aircraft or private helicopter.

Etymological Notes

Both Meurger (1999) and Ellis (1998) state that *Kraken* is the plural of *Krake* in Norwegian, the latter being the original name of the Kraken. This is not the case. For example *Krabben* is

not the Norwegian (Boksmål) for 'crawlers' or 'crabs'. Norwegian suffixes the article to the noun: therefore *Krabe* means 'a crab', *Krabben* means 'the crab', *Krabber* is 'crabs' and *Krabbene* is 'the crabs', likewise *Krake*, *Kraken*, *Kraker* and *Krakene*. The modern Danish equivalents would be *Krake*, *Kraken*, *Kraker* and *Krakerne* owing (I think) to the slightly different formation of the definitive plural.

The first mention of kraken in English (as 'kracken') is Egede (1745) not Pontoppidan (1755) as stated in the *Oxford English Dictionary*.

References (if not given in the text)

Anon (1998) *The Guinness Book of Records* 1999. London: Guinness World Records Ltd.

Antonelis, G.A., Lowry, M.S., Fiscus, C.H. Stewart, B.S. & Delong, R.L. (1994) Diet of northern elephant seals. In, B.J. Le Boeuf & R.M. Laws (eds.), *Elephant Seals* (pp. 211-223) University of California Press.

Baxter, R. (1998) *Bestiaries and their Users*. Stroud: Stround.

Boyle, P.R. (1991) *The UFAW Handbook for the Care and Management of Cephalopods in the Laboratory*. Wheathampstead: University Federation for Animal Welfare.

Clarke, M.R. (1980) Cephalapoda in the diet of sperm whales of the southern hemisphere and their bearing on sperm whale biology. *Discovery Reports*, **37**, 1-324.

Cook, A.S. (1919) *The Old English Elene, Phoenix, and Physiologus.* New Haven: Yale.

Coulter, C. C. 1926. The Great Fish in ancient story. *Transactions of the American Philological Association*, **57**, 32-50.

Egede, H. (1741) *Grønlands nye Perlustration eller Naturel Historie.* Copenhagen: Johan Christoph Groth. Translated into English (Anon, 1745) as *A Natural History of Greenland.* London: C. Hitch.

Egede, P. (1741) *Continuation af Den Grønlandske Mission. Forfattet i form af en Journal fra Anno 1734 til 1740.* Copenhagen: Johan Christoph Groth.

Ellis, R. (1998) *The Search for the Giant Squid*. New York: Lyons.

Heuvelmans, B. (1968) *In The Wake of the Sea Serpents.* New York: Hill & Wang.

Lee, H. (1883) *Sea Monsters Unmasked*. London: William Clowes.

Magnus, O. (1555) *Historia de Gentibus Septentrionalibus*. Rome.

Meurger, M. (1988) *Lake Monster Traditions: A cross-cultural analysis.* London: Fortean Tomes.

Meurger, M. (1999) Francesco Negri, the kraken and the sea serpent. *Fortean Studies*, **6**, 238-244.

Miller, C., Maynard, C. & Wilding-White, T. (1977) *Mysteries of the Unknown*. London: Usbourne.

Nicoll, M.J. (1909) *Three Voyages of A Naturalist*. London: Witherby.

Paxton, C.G.M. (in preparation) *A History of the Kraken.*

Paxton, C.G.M. & Holland, R. (in press) Was Steenstrup Right? A new interpretation of the 16th century sea monk of the Øresund. *Steenstrupia*.

Paxton, C.G.M., Knatterud, E. & Hedley, S.L. (in press) Cetaceans, sex & sea serpents: An analysis of the Egede accounts of a 'most dreadful monster' seen off the coast of Greenland in 1734. *Archives of Natural History*.

Pontoppidan, E.L. (1752-1753) *Det Förste Forsög paa Norges Naturlige Historie*. Copenhagen. Translated (1755) into English as *The Natural History of Norway.* London: A. Linde.

Roper, C.F.E & Boss, K.J. (1982) The giant squid. *Scientific American*, **246**, 96-105.

Shiels, 'Doc'(1984). Mother Nature's jumbo jet. *Fortean Times*, **42**, 62-67.

Steenstrup, J.J.S. (1980) On the merman (called the sea monk) caught in the Øresund in the time of King Christian III. (Trans. M. Roeleveld &, J. Knudsen) *Steenstrupia*, **6**, 307-330.

Thomas, L. (1996) No super-otter after all? *Fortean Studies*, **3**, 234-236.

Withers, P.C. (1992) *Comparative Animal Physiology*. London: Saunders College.

Woods, J. (personal communication, 2003) 'Most cephalopods do not expose their tentacles unless grabbing prey. However, some deep-sea species like *Brachioteuthis beani* swim with their tentacles out.'

SIGHTINGS OF THE MOA

Introduction by Michael Heap

The following information has been gleaned from three websites ('The Gibson Group', <www.gibson.co.nz>; 'The Kiwi Conservation Club', <www.kcc.org.nz>; and 'Jules', <www.jules.org >).

Moa are an extinct type of bird of which there were 11 species at the last count. They were ratites. Other ratites include ostrich, emu, cassowary, rhea, and kiwi. The biggest moa was the Giant Moa (*Dinornis giganteus*). It was taller than three metres and weighed about 250 kilograms. The smallest moa species was a little bigger than a turkey, about half a metre tall. Moa once roamed in massive numbers throughout New Zealand. Most lived in forest, not grassland. With no natural predators the moa led a carefree existence until the arrival of man. Some land was cleared by the Maori, which would have killed the moa directly or reduced its habitat. But the main reason the moa became extinct was hunting: they were eaten to extinction, along with other bird species. Scientists believe that moa were extinct by 1500 and that no white person ever saw a moa alive. However, there are stories that would have us believe that there were a few moa left in New Zealand when Captain Cook and his men arrived in 1769. There have even been tales told during the 1900s that there are still moa roaming around in New Zealand forests.

The following are two reports of such sightings:

It was in 1880, when I was seven years old, that I first saw the large bird that I now think must have been some kind of moa. I remember it distinctly. It was lying on the sand under the flax which grows on the edge of the bush inside the sand hills on the sea shore.